**EDUN 332 Unit Plan Guidelines**

1. Subject Area: Mathematics

Grade level: 7th Grade

Unit Title: The Wonderful World of Volume

II. Estimated Time: Ten (Two weeks) of 90 minute class periods.

III. Student Population:

22 students containing 12 females and 10 males: Two with ADHD and one with a behavioral disorder.

Stage 1 – Desired Results

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| **IV. Standards:**  **Mathematical State Standards:**  2.9.8.D. Identify, name, draw and list all properties of squares, cubes, pyramids, parallelograms, quadrilaterals, trapezoids, polygons, rectangles, rhombi, circles, spheres, triangles, prisms and cylinders.  2.8.8.C. Create and interpret expressions, equations or inequalities that model problem situations.  7-G : 6. Solve real-world and mathematical problems involving area, volume and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, and right prisms.  2.8.8.E. Select and use a strategy to solve an equation or inequality, explain the solution and check the solution for accuracy.  **Reading State Standards:**  1.4.8.A. Write short stories, poems and plays.   * Use relevant illustrations * Utilize dialogue * Apply literary conflict   1.1.8.A. Locate appropriate texts (literature, information, documents) for an assigned purpose before reading  1.1.8.F. Understand the meaning of and apply key vocabulary across the various subject areas.     1. **Understanding(s):**   Volume, area and surface area have a special place in the field of mathematics. Someone studying these topics has the ability to see their direct application in the world outside of abstract mathematical concepts. This unit uses this ability to bring the visualization of real world applications to the learning process. This will enable students to have a better grasp on the general concepts of **:**     * 1. Recognize a variety of 2~D and 3~D shapes.   2. Have already obtained an understanding of area of 2~D shapes and surface area of 3~D shapes.   3. Have familiarity with the formulas for volume of 3~D shapes.   4. Comprehend how to use these formulas to solve for volume of various 3~D shapes.   5. Understand how to manipulate these formulas to solve for the dimensions of the shape when given its volume.   **VI. Essential Question(s):**   1. What is the difference between a three dimensional and two dimensional shapes? 2. How do these differences affect the ability to calculate area, surface area and volume? 3. Do you believe you would ever use volume formulas outside the mathematics classroom? 4. How are these formulas used in real world situations? 5. **Attitude(s) and Value(s):** 6. Students should value their understanding of the materials, as well as the time and work they spent in learning these materials 7. Students should feel a new or heightened appreciation for mathematics outside of the classroom 8. Students should have confidence to complete calculations involving volume independently. 9. **Skill(s):** 10. *What skills related to acquiring, organizing and using information will students develop?* 11. Compare and contrast volume, area and surface area. 12. Construct mathematical organizers 13. *What technological skills will students develop?* 14. Computer Literacy 15. Internet Research 16. Spreadsheets 17. Online Manipulations 18. *What interpersonal skills will students develop?* 19. Working cooperatively in pairs. 20. Working cooperatively in trios. 21. Working cooperatively as a large group. 22. Making group presentations before the class |
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Stage 2 – Assessment Evidence

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| IX. Performance Task(s):  Students will have the ability to identify 2~D and 3~D shapes and their proper area, surface area and volume formulas.  Students will also be able to use these formulas to solve for area, surface area or volume as well as the ability to manipulate these formulas to solve for the various dimensions.  Students will be confident in their abilities to perform such tasks demonstrated through group presentations and individual assignments.  These separate criteria will be graded in various ways including project rubrics, individual assignment keys and participation. | Other Evidence:  The students will be required to perform different calculations on the materials presented in various ways such as warm up activities, exit slips and group cooperation.  Students will individually complete assignments to demonstrate their understanding of the materials presented.  Students are able to assess their own understanding of the materials while completing various tasks, such as the exit slips the last of which is a magic square quiz, to test their own knowledge.  If a student does not have the ability to complete any of the tasks set before them in this unit, it will demonstrate their need for further clarification. |

**Stage 3 – Learning Plan**

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| **X. Learning Activities**  The unit consists of 6 lesson plans. Three are complete lesson plans, as per the Holy Family Lesson Plan Format and three are summarized.  **Lesson #1: Title:** *The New Apartment* **(Full Lesson-Attached)**  **Lesson #2: Title:** *Shodor Volume Exploration*  **Time Estimation:** One class period  **Objective(s):**   1. Use prior knowledge of surface area to expand geometrical knowledge. 2. Expand upon this knowledge to begin developing an understanding of volume. 3. Students will attempt to discover the volume formulas for rectangular prism and cube     **Description:**  Students will be working in pairs to complete an online activity designed to help student explore the principles of the volume of rectangular prisms and cubes. The students will log onto Shodor.org and receive a correlated worksheet print out also from Shodor.org. The students will work in their pairs to complete the worksheet activity while manipulating the three dimensional shape on the website.    This activity instructs students to change various aspects of the shape and record their findings. The table of values and follow up questions are designed to guide the students to discover the patterns and thus formulas to calculate the volume of the cube and rectangular prism. This is intended to give the students a deeper understanding of the formulas.    **Background Information:**  <http://www.onlinemathlearning.com/surface-area.html>  **Teaching & Learning Materials:**  <http://www.shodor.org/interactivate/lessons/VolumeRectangular/>  Shodor Handout (Attached)  **Lesson # 3: Title:** *Volume Web Hunt*  **(Full Lesson-Attached)**  **Lesson #4: Title:** *Flossville*  **Time Estimation:** One class period  **Objective(s):**   1. Use prior knowledge of area to solve real world problems. 2. Expand upon this knowledge to begin developing a further understanding of volume. 3. Apply prior knowledge of geometry principles to solve other various problems.     **Description:**  Students will be working in pairs to complete an online activity on area and volume. The students will log onto MathByDesign.ThinkPort.Org and make a username. The students will work in their pairs to complete the Flossville activity on the website. This activity instructs students that they are on a committee to help design a community park.  The students are required to apply their knowledge of area, volume and other various geometric principles to solve various jobs to be done for the parks construction. Students will be required to follow instructions to place objects in the park. They will also be required to solve for materials needed and cost of these materials.    **Background Information:**  <http://www.onlinemathlearning.com/volume-formula.html>  **Teaching & Learning Materials:**   * <http://mathbydesign.thinkport.org/default.aspx?skipTo=flossville&cb=1335121225434>   **Lesson # 5: Title:** *Creating Comics* **(Full Lesson-Attached)**  **Lesson # 6: Title:** Volume Jeopardy Review  **Time Estimation:** One class period  **Objective(s):**   1. Use knowledge of volume to perform required calculations. 2. Work in a large group setting towards a common goal. 3. Apply prior knowledge of geometry principles to solve various problems.     **Description:**  Before beginning the lesson, the instructor will ask students if there is any need for further clarification on any of the materials presented. Students will then be divided into large groups. These groups will compete against each other while playing a Volume Review Jeopardy game. This game consists of questions related to the volume of various 3~D shapes.  The five sections to be used during this game are Prisms, Pyramids, Cylinders, Cones and Spheres. These topics cover all of the volume formulas for the shapes taught during this lesson. The winning team will receive bonus points toward the unit final grade. At the conclusion of the game, the students will be administered an Exit Slip magic square quiz (Hand Out) to test their knowledge of the content.    **Background Information:**  <http://www.onlinemathlearning.com/volume-formula.html>  **Teaching & Learning Materials:**  <http://jeopardylabs.com/play/volume36> |

XI. References:

*Comic creator*. (n.d.). Retrieved from <http://www.readwritethink.org/classroom-resources/student-interactives/comic-creator-30021.html>

*Flossville town park*. (2009). Retrieved from <http://www.MathByDesign.ThinkPort.Org>

*Interactive:volume of rectangular prisms*. (2012). Retrieved from <http://www.shodor.org/interactivate/lessons/VolumeRectangular>

*Room creations webquest*. (n.d.). Retrieved from <http://teacherweb.com/NY/SUNYPotsdam/Room_Creations/index.html>

*Volume jeopardy template*. (n.d.). Retrieved from http://jeopardylabs.com/play/volume36

XII. Reflection:

I absolutely love this unit plan. I think that this has made me challenge myself as a future teacher to create a lesson that will teach what is required, yet without any power points of teacher directed lectures. I allowed the students to develop an understanding of the basis of the formulas before learning the actual formulas to calculate the volumes. I allowed the students to then work in pairs to find these formulas and solve an equation for each type of problem. I gave them multiple real world applications and interesting projects to complete. I had the students work individually, in pairs, in trios and as large groups. If I were a student in my class, I would be very pleased to be completing a lesson like this compared to the average lecture and text book exercises most mathematics teachers present.